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Charmed Particle Production in Geant4

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Charmed Particle Production in Geant4

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Charmed particles production was observed and measured in fixed target experiments performed in CERN, Fermilab and DESY with hadron beams at energies from 200 GeV up to 900 GeV. The charmed particles production is studied by all RHIC and LHC collaborations. It is expected that the charmed particles will be copiously produced at the Future Circular Collider (FCC). Due to long life time of the particles, it will be needed to account their interactions with surrounded matter and detector materials. In order to meet the requirement, the charmed particles were introduced in the Geant4 toolkit. First of all, a list of the charmed particles according to PDG has been implemented. Their decay channels are not setting up until now, though there is a possibility for user to determine the channels in the Geant4. The next step was simulation of the charmed particle production in soft hadronic interactions. We followed to the Kaidalov – Piskunova approach [1,2]. The approach gives fragmentation functions of quarks into the charmed particles. It is assumed that there are no constituent charmed quarks in initial hadrons. All of these has been implemented in FTFP and QGSP hadronic generators of the Geant4 toolkit, and allow to reach a good description of known experimental data on the soft charmed particle production.
We have applied a simple scaling in calculation of cross sections of the charmed particles with nucleons [3]. We are going to generalize it for nuclear targets. We will consider some details of the implementation in our talk.

1. A.B. Kaidalov and O.I. Piskunova, Z. Phys. C 30, 145 (1986).
2. A.B. Kaidalov and O.I. Piskunova, Sov. J. Nucl. Phys. 43, 994 (1986).
3. V.N. Grichine, IEEE Trans. Nucl. Sci. 67, 1993 (2020).

The speaker is a student or young scientist

No

Section

1. Intermediate and high energies, heavy ion collisions

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